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ABSTRACT

To investigate whether the viewing of printed words influences children's ability to produce plural forms, 120 kindergarten and first grade children were tested individually on 36 items consisting of real words and nonsense syllables that represented three categories: words that required pronouncing the "s" sound as the natural oral plural; words that required pronouncing the "z" sound as the natural oral plural; and words that could be pronounced with "z" or "s," but where "z" was the correct and expected plural. Three groups participated in each grade level; a teaching group, a no-teaching group, and a control group. The results indicated that first grade children made more correct responses and fewer nonplural responses than did the kindergarten children. Among the kindergarten children there was a substantial amount of variation concerning correct responses and nonplural responses, and for some, print seemed to take precedence over their natural language patterns in forming plurals. In addition, some of the kindergarten children read the words with no plural sounds, even though they used plural forms in their oral speech. (MAI)

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Children's Production of Plurals: The Influence of Print

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Abstract

Presents results of an experiment investigating whether visual processing of print influences children's production of plurals. 120 kindergarten and first-grade children were individually tested with items falling into 3 categories: Category 1 required [s] as the natural oral plural (e.g., caps), Category 2 required [z] as the natural oral plural (e.g., pigs), and Category 3 could be pronounced with [z] or [s], but [z] was the correct and expected plural (e.g., knees vs. [nis] - niece). There were 3 groups for each grade level, a Teaching Group, a No Teaching Group, and a Control Group. A three-way ANOVA, grade x treatments x categories, revealed (a) significant grade effects and category effects for correct responses, with first-graders making more correct responses than kindergarteners and Category 1 eliciting more correct responses than Categories 2 or 3, and (b) significant grade effects for non-plural responses, with kindergarteners making more non-plural responses than first-graders. Kindergarteners' inconsistent use of plurals is discussed.

Children's Production of Plurals: The Influence of Print

Although researchers have investigated children's articulation of [s] and [z], both when these sounds represent the plural morpheme and when they occur as part of longer morphemes, research concerning the possible influence of the printed word on children's production of these segments is lacking. For example, Templin (1957), Snow (1963), and Gallagher and Shriner (1975) studied differences in children's articulation of sounds, including [s] and [z], with oral tasks and recordings of spontaneous speech. Berko (1958) reported age differences in children's production of plural allophones; her study has been widely cited, both in theoretical work and in articles drawing classroom applications from the study (see, for example, Taylor, 1976). And Anisfeld and Tucker (1967) studied the pluralization rules ([s], [z], [ɨz]) of young children, primarily kindergarten children, in a series of oral tasks; the children were given production tasks and recognition tasks where they were required to do such things as give plural forms for pictures (as in Berko's experiments) and match pictures with names.

However, none of the studies addressed the specific topic of whether visual processing of print influences, or possibly interferes with, children's normal articulatory responses. It is well known that such interference has occurred frequently in the historical development of English (Pyles, 1964). That is, the spelling of a word has sometimes caused people to change their normal pronunciation of it. Some of these changes, or spelling pronunciations, have persisted and become standard forms in the language. For example, a number of words acquired new spellings during the

Renaissance solely for visual effect; h was often inserted after t (Elizabeth, Anthony, Theresa, Thomas, Thames, anthem, throne), and some words of French origin were respelled to look more like their Latin equivalents (debt, doubt, and fault from French dette, doute, faute). Note that some of these words subsequently acquired new pronunciations; some did not (Pyles, 1964). Additionally, there is some experimental evidence that children may respond differently to spoken words than to printed words (Knafle, 1974).

Thus the purpose of this study was to investigate children's production of plurals while viewing printed words, with the expectations that (a) plurals requiring [s] (e.g., caps) would be easier for young children than plurals requiring [z] (e.g., pigs), (b) teaching the children that s represents the sound [s] would result in more [s] responses (than [z] responses) both for plurals requiring [s] and for plurals requiring [z], and (c) kindergarten children would have more difficulty with plurals than first-grade children.

Method

Subjects

The subjects were 60 kindergarten pupils (30 males, 30 females) and 60 first-grade pupils (30 males, 30 females) from an upper-middle class Chicago suburb who were tested individually during the spring semester.

Item Construction

The 36 items were constructed so that there were three categories, half of each category consisting of real words and half consisting of nonsense syllables. Nonsense syllables were included to see whether a child's rule for pluralization was applied to unfamiliar forms as well as to familiar words.

Another reason for including both real words and nonsense syllables was that Graves and Koziol (1971) found that children performed better with real words than nonsense words.

Category 1 (12 items) required [s] as the natural oral plural (cap, jet, duck, lip, bath, puff, dep, zot, mif, gath, rick, yut), and Category 2 (12 items) required [z] as the natural oral plural (pig, ham, cub, bed, rim, king, wug, vim, keb, fod, tam, hing). The items in Category 3 (12 items) were syllables to which either [s] or [z] may be added according to the phonological rules of English. However, [z] was the correct and expected plural, since the addition of [s] would result in the singular form of a different word, not the plural. (Compare knees - niece, falls - false, ones - once, tors - torce, luns - lunce, etc.) This category was included to determine whether the influence of the printed letter s would override the child's knowledge of English plural formation. The 12 items of Category 3 were knee, fall, one, car, fin, bee, lun, tor, cra, nall, dee, and jer.

Procedure

There were three groups, the Teaching Group, the No Teaching Group, and the Control Group. All children were first shown a page containing the words "There is one" with "There are two" directly underneath. Each child was asked to read the six words aloud; if he could not, the examiner read and pointed to each word and then had the child repeat and point to each word.

The Teaching Group was then shown four pages of items, each containing one of the following four pairs: "There is one bat. There are two bats." "There is one cup. There are two cups." "There is one mok. There are two moks." "There is one vif. There are two vifs." (The plurals all required [s], not [z].) For each page, the experimenter read the first sentence aloud, pointing to each word while reading. The experimenter then read the second

sentence aloud, telling the child to read along orally, and also continuing to point to each word. The children were then given the 36 test items. The experimenter read the first sentence aloud (pointing to each word for the first 3 or 4 items). The experimenter then read the first three words of the second sentence aloud, encouraging the child to read along orally; the experimenter waited for the child to pronounce the last word, the plural. (The procedure was a modification of the work of Berko, 1958.) If the child did not respond, the experimenter said, "I'll read the first sentence, and you read the second sentence." For the Teaching Group, the items were presented in the following order: Category 1 nonsense words, Category 1 real words, Category 3 nonsense words, Category 3 real words, Category 2 nonsense words, and Category 2 real words. If, at the beginning of the test, the child gave the singular instead of the plural, the experimenter said, "If a dog came in here right now, I'd say, 'There is one dog,' but if two came in we'd say, 'There are two - what?'" The child responded, "two dogs" or "two dog."

The No Teaching Group, after being shown the page containing "There is one, There are two," was given the 36 test items in the same order and with the same procedure as the Teaching Group.

The Control Group, after being shown the initial page, was given the 36 test items presented in the following order: Category 3 nonsense words, Category 3 real words, and a random presentation of words in Categories 1 and 2. The procedure was the same as that in the Teaching Group and the No Teaching Group.

Items were presented in the given order in the Teaching and No Teaching Groups to avoid the possibility of children's responses to the nonsense words being influenced by their responses to the real words. (Nonsense words were

presented first.) [s] items (Category 1) were presented first to reinforce the teaching before presenting the [z] or [s] items (Category 3). Since presentation order, regardless of teaching might have influenced responses to Category 3 items, the No Teaching Group was considered necessary. For the Control Group, Category 3 items were presented first to get the children's responses without the possible carryover influence of [s] items. Also, four of the items were the same as those used by Berko (wug, lun, tor, cra).

All words were typed on a primary typewriter. There were two sentences on each page, with the plural sentence placed directly underneath the singular sentence. The pages were covered with plastic and placed in a ring notebook.

After the children (in all three groups) had completed the 36 items, they were told to repeat the following sentences (one at a time, after the experimenter) into a microphone: "I saw the bus. I heard the buzz. Of course. I have two ears. I saw someone else. I heard two bells. This book is Dan's. I can dance." Sentences were constructed so that the children's natural articulation of normal [s] and [z] could be assessed; [s] or [z] was placed at the end of each sentence under the variety of controlling conditions which were in the 36 test items.

Kindergarten children who gave consistent non-plural responses were then shown pictures to assess whether the children used plurals in their normal speech. Each picture had one figure at the top of the page and two figures at the bottom of the page. Each child was told, "I'm going to show you some pictures. Look at this. This is one car. There is one car. There are two - what?" The child responded, "two cars" or "two car." The examiner then showed the child each remaining picture, saying, "There is one ball

(etc.)" and encouraged the child to say the plural sentence. (Note: Most children said "there's two," not "there are two.") The pictures shown were cars, balls, cats, dogs, trees, bones, houses, kebs (animals), luns (flowers), and zots (boats). The children's responses were assigned to the following categories: (a) [s],(b) [z],(c) non-plural, i.e., the singular form was repeated, and(d) other. It should be noted that in classifying the children's responses as [s] or [z], the fact that phrase-final fricatives are partially devoiced in most English pronunciations was taken into account. These children exhibited a high degree of devoicing, as do most adult speakers (i.e., there was only a very brief period of voicing at the beginning of the [z]). If voicing was perceived in the child's final fricative, the response was counted as [z]. Where no voicing was perceptible, the distinction between [s] and [z] was based on the length of the preceding vowel and the length and intensity of the consonant. (Final [s] is longer and more intense than final [z]; the vowel preceding final (devoiced) [z] is longer than the vowel preceding final [s].)

A response was considered correct when [s] was given as the plural for Category 1 words, and when [z] was given as the plural for Category 2 and Category 3 words.

Statistical Treatment

A three-way analysis of variance, grade x treatments x categories, using a repeated measures design (Winer, 1971, p. 566) was computed for correct responses and for non-plural responses. The Tukey (hsd) test was used to analyze pair means.

Results

For correct responses, grade effects were significant at the .001 level (F (1,114) = 24.58); first-grade children gave significantly more correct responses than kindergarten children on the 36 item task. Category effects

were significant at the .001 level (F (2,228) = 9.25). Tukey comparisons showed that the children gave significantly more correct responses on Category 1 versus Category 2 ($p < .005$) and on Category 1 versus Category 3 ($p < .001$); the difference between Categories 2 and 3 was not significant. Treatment effects and interaction effects were not significant. Table 1 presents means and standard deviations and Figure 1 shows the percentage of correct responses under the conditions of grade, category, and treatment.

Insert Table 1 and Figure 1 about here

For non-plural responses, grade effects were significant at the .001 level (F (1,114) = 20.92); kindergarten children gave significantly more non-plural responses (mean = 8.22, SD = 3.11) than first-grade children (mean = .03, SD = .15) on the 36 item task. Neither treatment effects nor category effects were significant; interaction effects were not significant. All but three of the responses were [s], [z], or non-plural. The three responses classified as "other" occurred when a child said, "There are two two(s)" as the plural of "There is one one." Twenty-seven of the 60 kindergarten children (45%) gave some non-plural responses, and 12 of the 27 children gave at least 80% non-plural responses. Analysis of the oral responses of the 12 kindergarten children who gave at least 80% non-plural test responses showed that 3 children did not have the plural form in their speech; when showed the pictures, they responded with the singular form to all items. The other 9 children used the plural in their speech at least part of the time; for example, one child gave the plurals cars and balls for the pictures but kept the remaining 8 picture items singular. Of particular interest were the 6 children

who responded orally "two dogs" after the first or second test item but then went right on reading the items as singular. It seemed as if they regarded the process of reading as being unrelated to oral language, in terms of reading plurals they knew orally.

No differences were found between responses elicited by nonsense words versus real words for all three categories for both kindergarten and first-grade children.

An item analysis was computed for each grade level according to the procedure recommended by Davis (1964). The results showed that no test item was unsuitable. A comparison of the four items that were the same as Berko's revealed some percentage differences in correct responses for kindergarteners and first-graders. Table 2 presents percentages of correct responses for individual items, comparing our results with Berko's where appropriate.

Insert Table 2 about here

Discussion

The finding that first-grade children made more correct responses and fewer (almost no) non-plural responses than kindergarten children was expected. However, among the kindergarteners, there was a substantial amount of variation concerning correct responses and non-plural responses; this finding seems consistent with C. Chomsky's (1972) finding that "there was considerable variation in age of acquisition in different children" (p.5) for some of the linguistic structures she examined.

The finding that the children made more correct responses on Category 1 ([s] items) than on Category 2 ([z] items) was expected and is in agreement with data of Templin (1957) who found that [-s] was acquired earlier than

[-z] for children in a speech assessment study and is also in agreement with data of Snow (1963) who found fewer [-s] errors than [-+z] errors for first grade children.

The fact that the teaching component of this study was not effective may be accounted for by (a) the short duration of the teaching, (b) the possible need to base amount of teaching time on individual differences, and/or (c) the possibility that differences may be due to developmental constraints rather than by being influenced by teaching.

A particularly interesting finding of this study was that for some kindergarten children, print seemed to take precedence over their natural language patterns concerning plurals, since they read items like two cars with [s], even though they said two cars with [z] when they were not looking at the print. Perhaps in the early stages of learning to read, the attention of some young children is so intense and so completely directed to the task of trying to decode the printed words that the children block out their previously acquired knowledge, in this case phonological knowledge. (A possibly similar occurrence takes place when children "read" orally, decoding words in a sentence accurately but then being unable to tell the meaning of the sentence, even though they know the words and the concepts.)

There is also the question of why some kindergarten children read with no plurals, even though they had plurals in their speech. Perhaps the children (a) had not yet learned that s at the end of a word signifies a plural prononciation or (b) did not notice the s at the end of the word. Still, even if both (a) and (b) occurred, the fact that the children used plurals in their speech shows that the children seemingly tuned out their natural language system of plurals while attempting to read the print. Was their concentration on the task of decoding so acute that the natural and habitual process of using plurals was suppressed? Did the attempt to read

the words cause some kind of attentional, memory, or sensory overload for those children?

Why the children responded differently in slightly different situations is an open question. In speech assessment studies, Faircloth and Faircloth (1970) and Prutting (1970) found that children's spontaneous speech production was different from their speech when they were given formal articulation tests. Dever (1972) found that the results from a revised version of Berko's test of morphology were not consistent with the results from free speech production for educable mentally retarded children. And Anisfeld and Tucker (1967) found that in their production tasks for children (primarily kindergarteners), there were no significant differences in errors with syllables requiring either [s] or [z], while in their recognition tasks, the children made fewer errors with [z] than [s].

A major difference between this study and Berko's (1958) study is that none of her children (19 pre-schoolers, 61 first-graders) added [s] to such forms as cra or lun, but, if responding incorrectly, gave the singular form for the plural. In the present study, 11 kindergarten children gave [s] for cra, lun, or tor. For all 12 items in Category 3, 22 kindergarteners gave at least one [s] response. (The total number of responses to Category 3 items was 720 (12 items x 60 kindergarteners); 519 responses were correct, 163 responses were incorrect non-plural responses, 45 responses were [s] responses, and 3 responses were other responses.) The different findings may have been caused by such factors as population differences, the numbers of children tested, or kindergarten instruction in letter names. However, whatever the cause for some kindergarten children giving [s] for Category 3 items (and surprisingly 11 kindergarteners gave at least one [s] response for Category 2 items), the incorrect [s] response was less common in the

first-graders' responses, suggesting that the [s] inaccuracies disappear of their own accord as children view reading as something more than mere translation of print to sound.

Despite the fact that there are many unanswered questions to be explored, it seems that the presence of the printed word does influence the production of plural forms for some young children. It is possible that print also influences other aspects of language production and development. Studies of children's articulation, language development, and reading acquisition should not overlook these variables.

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Table 1

Correct Responses for Grade, Category, and Treatment

Grade	Group[a]	Category 1 (S)		Category 2 (Z)		Category 3 (Z or S)	
		Mean	SD	Mean	SD	Mean	SD
K	T	10.45	3.22	10.20	3.92	9.55	4.10
	No T	8.95	4.48	7.20	4.99	7.65	4.53
	C	8.55	5.23	8.00	4.93	8.20	4.76
1	T	11.90	.44	11.60	.80	11.85	.48
	No T	12.00	0	11.35	2.61	11.05	2.06
	C	11.95	.22	11.90	.44	11.30	1.23
K + 1	all grps. combined	10.63	3.42	10.04	3.92	9.94	3.67

All Categories Combined

Kindergarten		Grade 1	
Mean	SD	Mean	SD
26.27	4.62	34.97	1.28

[a]T = teaching, No T = no teaching, C = control

Table 2

Percentage of Correct Responses for Individual Items

Items	This Study		Berko's Study	
	Kindergarten	1st Grade	Preschool	1st Grade
wugs	70%	97%	76%	97%
luns	58%	88%	68%	92%
tors	75%	90%	73%	90%
cras	70%	98%	58%	86%

Other Items In This Study

Items	Kindergarten	1st Grade	Items	Kindergarten	1st Grade
caps	75%	100%	cubs	63%	95%
jets	80%	100%	beds	75%	95%
ducks	80%	98%	rims	75%	98%
lips	80%	100%	kings	73%	98%
baths	73%	98%	vims	70%	98%
puffs	75%	100%	kebs	68%	93%
deps	78%	100%	fods	72%	98%
zots	82%	100%	tams	67%	98%
mifs	77%	100%	hings	70%	97%
gaths	77%	98%	knees	72%	95%
ricks	78%	100%	falls	72%	98%
yuts	77%	100%	ones	63%	95%
pigs	75%	95%	cars	77%	97%
hams	68%	98%	fins	62%	88%
bees	75%	97%	nalls	73%	98%
dees	77%	97%	jers	75%	98%

Figure Caption

Figure 1. Percentage of correct responses under the conditions of grade (K, 1), category (1 = [s], 2 = [z], 3 = [z] or [s]), and treatment (T = teaching, NoT = no teaching, C = control).